FINANCING MUNICIPAL WATER SUPPLY SYSTEMS

The Congress of the United States
Congressional Budget Office

NOTE

All years referred to in this report are fiscal years unless otherwise indicated.

PREFACE

This paper assesses the extent to which the financing of local water supply facilities will burden state and local governments in the next two decades, and suggests alternatives by which federal, state, and local governments can reduce water supply expenditures. This paper responds to a request by the Senate Committee on Environment and Public Works.

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Concern that localities would be unable to finance needed water supply facilities prompted the 99th Congress to consider (and the House to pass) bills that would have significantly expanded the federal role in financing municipal water supply systems. Similar legislation is likely to be introduced in the current Congress. Paradoxically, the last Congress also reduced funding for existing programs that support these systems. The Administration's budget for fiscal year 1988 seeks further reductions in most of these programs.

From fiscal years 1977 through 1983, water utilities spent an average $4.7 billion annually to replace and expand local water supply facilities. Nationwide, capital spending per capita averaged $25 per year. Spending across regions varied widely, from $10 per capita in the Mid-Atlantic region to $54 per capita in the Mountain states. The CBO projects that for the United States as a whole, annual capital spending for local water supply will be 11 percent less per capita from 1984 through 2000 than it was in the 1977-1983 period. In six of the nine Census regions, capital spending will fall, declining between 3 percent in the New England area and 32 percent in the South Atlantic region. Capital spending will rise in three regions, but in two of these regions, the increase will be less than 10 percent. In only one region, the Mid-Atlantic, will per capita capital expenditures rise sharply--by over 40 percent.

STATE AND LOCAL POLICY OPTIONS

State and local governments could pursue a number of strategies to reduce the amount of capital investment that will be needed for water supplies. These include promoting water conservation through price reform and consumer education, adopting less capital-intensive water supply technologies, and taking advantage of recent financial innovations.

Reforming price schedules holds particular promise, because many public water utilities charge prices that are less than the full cost of supplying water. Lacking signals about the true cost of water, consumers use more than they would if they had to pay for the full cost of their consumption. The result is overinvestment in water supply facilities.

In the 17 western states where existing water rights exceed the average supply, state governments could also encourage more efficient use of water by allowing markets a greater role in allocating the existing water supply. Markets work well only if there are unambiguous, transferable, and quantifiable property rights attached to the good being traded. Under current law, such rights rarely exist for water. Despite the difficulties raised by current law, voluntary water transfers do occur and have become more common in recent years. While most transfers result from individual negotiations among the affected parties, some fledgling water markets have been started. That these transfers take place, despite the lack of supporting institutions and despite the legal complexities involved, suggests that far more transfers would occur if the legal and institutional climate were more conducive to trade.

For most areas in the eastern United States, water is not scarce, but simply inefficiently distributed--that is, individual systems sometimes experience large shortfalls while the water-basin as a whole has an abundant supply. A water-short system could build new capital facilities to import water from outside the basin. Alternatively, the system could pursue the less expensive method of connecting and jointly operating the individual systems in a region. The greatest barrier to system interconnection is a lack of information. State governments could serve the role of "honest broker," developing and disseminating information that could be expensive for an individual locality to acquire, but crucial to the prospects of any joint operating agreement.

Finally, states could create a legal and institutional climate that minimized the cost of capital for local water utilities. In general, state governments could increase the range of financial instruments available to local water authorities. States also could use their stronger position in credit markets to assist localities more directly. For example, states could establish bond pools for local issues, which would help issuers take advantage of the economies of scale that characterize credit markets.

FEDERAL POLICY ALTERNATIVES

By providing support for municipal water supplies, the federal government has sought to further several goals, including increasing the availability and quality of local water supplies, promoting efficient state and local water supply policies, and increasing local economic development. When considering the direction of future federal policies for water supply, the Congress might wish to add a further goal: reducing the federal deficit. Several approaches to meet the last goal are discussed below.

Reduce or Eliminate Federal Grants and Loans for Local Water Supply

The Administration's budget request for fiscal year 1988 calls for a sharp reduction of federal grants and loans for constructing facilities for municipal water supplies. The Administration's proposals would lower federal spending by more than $200 million annually compared with spending under current law.

Maintain Current Support for Municipal Water Supplies

By restructuring existing programs, the Congress could maintain the existing level of federal support for municipal water supply, while furthering other goals such as reducing the federal deficit.

Facilitate Voluntary Transfers of Federally Controlled Water. Nearly all water rights, including rights to water from federal water projects, are held under state law. In those states that encourage water transfers, however, the federal role could be significant. Bureau of Reclamation projects deliver nearly 20 percent of western agricultural water, and users of that water must comply with federal as well as state rules governing its distribution. Trading water rights would reduce the cost of local water supplies (by reducing the need to build more expensive capital projects), while increasing federal revenues by raising both income taxes and payments to the Bureau of Reclamation.

Restructure Requirements for FmHA Loans and Grants. The Farmers Home Administration (FmHA) provides grants and loans to small, low-income communities in order to promote investment in water supply facilities. The current structure of the FmHA's program unintentionally also encourages localities both to choose inefficient, capital-intensive facilities and to maintain those facilities poorly.

The Congress could address these problems through a number of alternatives. First, the FmHA could provide technical and financial advice directly to communities. The cost of this service would partially be offset by the increased efficiency of investments by FmHA program beneficiaries. Second, as part of the grant application, the FmHA could require communities to examine specific alternative solutions to their water supply problems. While this would bring a variety of alternatives to the attention of local water supply officials, it might increase the importance of grantsmanship in determining which communities receive FmHA funding, making the efficient provision of water supply facilities relatively less important. Finally, FmHA grants and loans could be conditioned on the willingness of recipients to comply with a specific maintenance schedule. Publishing these

schedules would be useful for local officials unsure of the optimal maintenance timetables for their plants. The requirement that communities must follow predetermined maintenance schedules, however, would carry with it the danger that such schedules would disregard local conditions or be too expensive to develop properly.

Revolving Fund for Local Water Supply Facilities. Current grant and loan programs for water supply could be combined and used to capitalize a revolving fund. The fund would make low-interest loans to states and localities for use in expanding or rehabilitating water supply systems. Loan repayments would be used to make further loans. Earmarking funds for water supply would make federal subsidies more predictable. If earmarking reduced the frequency of Congressional review, however, allocations would be less likely to reflect Congressional spending priorities.

CHAPTER I

INTRODUCTION

Concern that localities would be unable to finance water supply facilities prompted the 99th Congress to consider bills that would have significantly expanded the federal role in financing municipal water supply systems. Similar legislation is likely to be introduced in the current Congress. Paradoxically, the last Congress also reduced funding for existing programs that support municipal water supply systems. The Administration's budget for fiscal year 1988 seeks further reductions in most of these programs. This paper assesses the extent to which the financing of local water supply facilities will impose an increasing burden on state and local governments in the next two decades.

CHARACTERISTICS OF MUNICIPAL WATER SYSTEMS

Any governmental effort to assist the water supply industry must take account of the remarkably heterogeneous nature of that industry. This section briefly discusses some of the financial and operating characteristics of municipal water supply companies.

Size and Ownership. There are about 59,000 water supply systems in the United States. A few of these systems are quite large, but most are small; only 1.1 percent of all systems serve more than 44 percent of the population, while 65 percent of all systems supply water to less than 3 percent of the population. 1/

Municipal water utilities are owned either publicly or privately. The publicly owned municipal water supply systems provide water to the greatest number of people, with some 26,000 systems serving 71 percent of

1. Unless otherwise noted, the information presented in this chapter comes from three sources: Environmental Protection Agency, Office of Drinking Water, *Survey of Operating and Financial Characteristics of Community Water Systems* (prepared by Temple, Barker, and Sloan, Inc., October 1982); Environmental Protection Agency, Office of Drinking Water, *Fiscal Year 1983 Status Report: The National Public Water Supply Program* (1984); and U.S. Geological Survey, *National Water Summary 1985* (1986).

the U.S. population. Of these, the largest 500 systems serve 39 percent, while the smallest 20,000 systems together serve less than 7 percent. On average, each publicly owned system supplies water to 7,500 people (see Table 1).

Regulated investor-owned utilities and smaller, unregulated systems owned by homeowners associations serve another 13 percent of the U.S. population. These 16,000 privately owned utilities average about a third the size of publicly owned systems. Mobile home parks, hospitals, schools, and other institutions own and operate about 17,000 small, ancillary systems; on average, these systems serve about 60 people each. About 15 percent of the U.S. population has private wells, and another 1 percent has no piped water supply.

Pricing Policies. Publicly owned utilities almost always charge less for water than do their privately owned counterparts. The lower prices stem in part from the tax-exempt status accorded publicly owned agencies; unlike private firms, the production costs of public utilities include no tax payments. More important, public utilities' fees need not cover their full costs of production; local tax revenues or intergovernmental grants can make up any deficit.

Thus, while both public and private utilities usually set prices that are more than sufficient to cover operating costs, only private utilities routinely charge enough to cover fully not only operating costs but also the depreciation of capital facilities. For example, a recent survey found that the ratio of operating revenues to operating expenses averaged only 1.19 for publicly owned utilities, compared with 1.59 for those owned privately. 2/

Private and public utilities also differ in the relative prices that they charge households and industrial users. Public utilities generally charge households about 20 percent more than they charge commercial users; private firms, in contrast, charge households about 50 percent more (see Table 2).

Most water utilities, both private and public, use a two-tier rate structure: customers pay both a monthly or annual flat fee and a fee per unit of water used. Larger systems are most likely to use "declining block rates," in which the fee for water use falls as the amount consumed rises, as

2. Environmental Protection Agency, Office of Drinking Water, *Survey of Operating and Financial Characteristics*, pp. iv-10.

TABLE 1. SIZE AND OWNERSHIP OF MUNICIPAL WATER SUPPLY SYSTEMS, BY NUMBER OF PEOPLE SERVED

Ownership	Fewer than 3,300	3,301-10,000	10,001-25,000	25,001-50,000	50,001-75,000	75,001-100,000	Over 100,000	Total
All Systems								
Number of systems	52,212	3,851	1,243	1,163	224	101	276	59,071
Percent of systems	88.4	6.5	2.1	2.0	0.4	0.2	0.5	100
Percent of U.S. population served	8.5	7.9	7.4	15.3	5.0	3.1	36.7	84
Publicly Owned Systems								
Number of systems	20,476	3,454	1,057	944	182	82	229	26,424
Percent of public systems	77.5	13.1	4.0	3.6	0.7	0.3	0.9	100
Percent of U.S. population served	6.4	7.1	6.4	12.6	4.1	2.6	31.9	71
Privately Owned Systems								
Number of systems	14,830	397	186	219	42	19	47	15,740
Percent of private systems	94.2	2.5	1.2	1.4	0.3	0.1	0.3	100
Percent of U.S. population served	1.6	0.9	1.1	2.8	0.9	0.6	5.1	13.0
Ancillary Systems								
Number of systems	16,907	0	0	0	0	0	0	16,907
Percent of ancillary systems	100	0	0	0	0	0	0	100
Percent of U.S. population served	0.6	0	0	0	0	0	0	0.6

SOURCE: Congressional Budget Office from Environmental Protection Agency, Office of Drinking Water, *Survey of Operating and Financial Characteristics of Community Water Systems* (prepared Temple, Barker, and Sloan, Inc., October 1982.)

TABLE 2. AVERAGE WATER PRICES, BY NUMBER OF PEOPLE SERVED
(In 1982 dollars per 1,000 gallons)

	1,001-3,300	3,301-10,000	10,001-25,000	25,001-50,000	50,001-75,000	75,001-100,000	100,001-500,000	500,001-1,000,000	Over 1,000,000
Public Utilities									
Residential	1.51	1.23	0.94	1.08	1.02	0.84	0.91	0.66	0.62
Commercial/ Industrial	1.01	1.29	0.76	0.82	0.80	0.93	0.61	0.55	0.51
Private Utilities									
Residential	1.98	1.69	1.65	1.56	1.32	1.28	1.63	1.25	0.85
Commercial/ Industrial	1.35	1.26	0.97	1.03	0.83	0.98	1.07	1.07	0.56

SOURCE: Congressional Budget Office from Environmental Protection Agency, Office of Drinking Water, *Survey of Operating and Financial Characteristics of Community Water Systems* (prepared by Temple, Barker, and Sloan, Inc., October 1982).

shown in Table 3. The accompanying box defines the various rate structures used by public and private utilities.

Sources of Capital. A variety of sources provide capital for water supply investments. Available evidence suggests that tax-exempt bonds supply about half of the capital used by water supply utilities. Retained earnings make up another 20 percent to 30 percent. Intergovernmental aid, taxable bonds, and proceeds from the sale of stock together contribute about 10 percent. Bank loans and special tax assessments provide the remainder. 3/

The source of investment funds varies with the size and ownership of water systems. Large public utilities rely mainly on funds borrowed in the tax-exempt bond market; their private counterparts use proceeds from the sale of stocks and taxable bonds instead. Small public utilities rely more on retained earnings, supplementing these with federal aid and tax-exempt bonds. Small privately owned utilities also depend on retained earnings, but substitute private bank loans for tax-exempt debt and federal aid.

THE FEDERAL ROLE IN MUNICIPAL WATER SUPPLY

Various federal policies subsidize both public and private water utilities. The tax code provides the largest subsidies: the interest on state and local bonds issued on behalf of public or private water utilities is tax exempt. This tax exemption lowers water utility borrowing costs by about 20 percent, since tax-exempt bonds can be sold with lower interest rates than can their taxable private counterparts. These bonds provide only limited tax benefits to private utilities, however, since private facilities financed with tax-exempt bonds must be depreciated more slowly than otherwise would be true. In 1983, state and local governments issued $2.75 billion in tax-exempt bonds on behalf of water utilities; $2.6 billion specifically aided public utilities. The tax exemption on the 1983 bond issues will lower federal revenues by roughly $100 million per year over the life of the bonds.

Direct federal spending for water supply facilities benefits only public water utilities and has a rather narrow focus: to stimulate economic de-

3. Based on data from the Public Security Association; the Bureau of Economic Analysis; Environmental Protection Agency, *Survey of Operating and Financial Characteristics*; and John Boland, *Water and Wastewater Pricing and Financial Practices in the U.S.*(prepared for the Agency for International Development, Near East Bureau, 1983).

velopment and to help low-income communities afford improvements in their water supply facilities. Three federal agencies administer programs whose primary purpose is to improve municipal water supply facilities. Three other agencies manage programs intended to promote regional economic development generally; improving local water facilities is only one of many purposes towards which program funds may be put.

TABLE 3. PERCENT OF VARIOUS RATE STRUCTURES USED BY PUBLIC AND PRIVATE UTILITIES IN FISCAL YEAR 1982, BY NUMBER OF PEOPLE SERVED

Rate Structure	Small (500 - 1000)		Medium (25,000-50,000)		Large (500,000-1,000,000)	
	Public	Private	Public	Private	Public	Private
Flat Fee	13	26	4	0	5	0
Flat Rate	6	0	15	0	15	0
Two-Tiered Flat System	29	26	28	15	10	0
Declining Block						
Pure	23	4	20	10	10	14
Two-tiered	15	18	20	54	25	29
Increasing Block						
Pure	4	2	2	0	0	0
Two-tiered	0	0	2	3	0	14
Other a/	8	20	8	18	35	43

SOURCE: Congressional Budget Office from Environmental Protection Agency, Office of Drinking Water, *Survey of Operating and Financial Characteristics of Community Water Systems* (prepared by Temple, Barker, and Sloan, Inc., October 1982).

NOTE: The accompanying box defines the rate schedules displayed in this table.

a. Other = rate structures not otherwise included above. Also includes systems which have different types of rate structures for different customer classes.

DEFINITIONS OF RATE SCHEDULES USED BY WATER UTILITIES

Flat Fee: flat fee paid monthly or annually, not based on water use.

Flat Rate: constant flat rate per unit of water use.

Two-Tiered Flat System: combination of the above rate structures--that is, flat fee plus flat rate.

Pure Declining Block: charge per unit of water declines with increasing water use.

Two-Tiered Declining Block: declining block rate with initial minimum charge covering specified amount of water use.

Pure Increasing Block: charge per unit of water increases with increasing water use.

Two-Tiered Increasing Block: increasing block rate with initial minimum charge covering specified amount of water use.

The **Farmers Home Administration** (FmHA) funds the construction, repair, expansion, and first-year operating expenses of water facilities in rural communities with populations under 10,000. In fiscal year 1985, the FmHA lent about 70 percent of its funds; the remainder was given as grants to communities that could not pay "reasonable user charges" (measured by the ratio of debt service to median local income). 4/ The FmHA distributes funds based on each state's rural population and the number of its households below the poverty level. Outlays under this program peaked in fiscal year 1979 at about $1.2 billion, and have fallen since to $470 million in 1985.

4. Since 1982, FmHA has made loans at three sets of interest rates: communities with median household income below the poverty line and with water systems that violated state or county health codes have paid a "poverty level" interest rate; communities with median household income between 80 and 100 percent of the U.S. median income pay an intermediate rate; and communities with median household income above the U.S. nonmetropolitan median income have paid a "market rate." In 1985, 42 percent of all FmHA loans carried market rates of 8.6 percent to 10 percent, 39 percent of the loans carried intermediate rates of 6.8 percent to 7.5 percent, and 19 percent carried the poverty rate of 5 percent.

The Water Supply Act of 1958 authorizes both the **Army Corps of Engineers** and the **Bureau of Reclamation** to include storage for municipal water supplies in their ongoing multipurpose water projects. Neither agency, however, may build single-purpose water supply projects. Funding for the water supply portion of corps and bureau projects is provided partly by state and local agencies. Until 1986, these agencies paid about 71 percent of the combined construction and operating costs for bureau projects and 54 percent for corps projects. The Water Resources Development Act of 1986 requires state and local agencies to pay the entire cost of all corps projects that they request. 5/

The **Department of Housing and Urban Development** administers **Community Development Block Grants** (CDBGs), the largest of the economic development programs. CDBGs can be used to fund projects that aid low- and moderate-income people or alleviate conditions that pose an immediate threat to a community's health or welfare. The grants sometimes are used to improve public facilities like water and sewer systems. CDBGs are distributed as entitlements to communities of 50,000 or more. These communities receive block grants whose size depends on population, poverty, and overcrowding in each community. Each block grant recipient decides which projects to fund with CDBG money. Communities of fewer than 50,000 people are eligible for CDBG "discretionary" funds. Unlike entitlements, these funds are awarded on a project-by-project basis. During the last several years, about $40 million to $50 million a year in block grants and $100 million to $200 million annually in discretionary grants have been used for water supply projects.

The **Appalachian Regional Commission** (ARC) and the **Economic Development Administration** (EDA) provide economic development funds to needy states, counties, and cities. These funds, awarded on a project-by-project basis, can cover up to 80 percent of a project's cost. Since 1965, annual spending for water supply projects under EDA's program has fluctuated between $35 million and $45 million, while ARC spending for water supply has remained at about $10 million per year.

In total, direct federal spending for local water supplies averaged $738 million a year from fiscal years 1967 through 1976. Federal spending doubled during the next five years, but then fell back to an average $785 million annually from 1982 through 1985. From 1967 through 1976, direct federal outlays for water supply comprised about 18 percent of all public

5. For an historical perspective on cost sharing, see Congressional Budget Office, *Efficient Investments in Water Resources: Issues and Options* (August 1983).

capital expenditures for water supply. Federal outlays rose to an average of 27 percent of public capital investment from 1977 through 1981 and then fell to its earlier level from 1982 through 1985.

RECENT LEGISLATIVE PROPOSALS

In the last two years, the Congress has considered measures that would have taken the federal role in water supplies in quite different directions. The Administration's recent budget requests have consistently called for curtailing federal aid for water supply, while some Congressional proposals have sought to increase the federal presence.

The Administration's Fiscal Year 1988 Budget Proposal. The President's budget proposal for fiscal year 1988 would sharply reduce or completely eliminate most of the federal programs that aid water supplies. The Administration would eliminate EDA, ARC, and the water supply component of FmHA, and reduce funding for CDBGs (see Table 4). By 1990, direct federal spending for water projects would equal no more than 10 percent of all projected public capital spending for water supply facilities.

The Water Resources Development Act of 1986. The 99th Congress passed an omnibus water bill, the first since 1970. The act authorized the construction of a host of new water resources projects, including improvements to inland waterways and flood control systems. The bill also changed the formulas by which the cost of these projects is divided between federal and nonfederal agencies. In general, nonfederal agencies will be required to pay for a significantly larger share of costs on the projects that they request.

The House-passed version of this bill would have established a new federal loan program, administered by the Army Corps of Engineers, to rehabilitate municipal water supply systems. The program would have provided low-interest loans to both public water utilities and investor-owned water systems operating under state regulation. In general, these loans could have covered up to 80 percent of the cost of projects that rehabilitate or improve water systems. The loan ceiling could have been exceeded if a project served remote areas or if the Secretary of the Army found "economic reasons" for doing so. All loans would have been conditioned on the recipient establishing a water conservation program that included, among other things, rate reform and education campaigns to promote water conservation. Neither the Senate version of the bill nor the final act included the House loan program.

Infrastructure Revolving Funds. Concern about the adequacy and efficiency of overall federal infrastructure spending has prompted Congressional consideration of a number of bills that would have established revolving funds to finance state and local infrastructure spending, including water supply fa-

TABLE 4. FEDERAL SPENDING FOR WATER SUPPLY, BY FEDERAL AGENCY, FISCAL YEARS 1986-1988 (In millions of current dollars)

Federal Agency	Current Policy 1986 Outlays (Actual)	Current Policy 1987 Outlays (Estimated)	Administration Proposal for 1988 Outlays (Estimated)
FmHA			
Loans a/	170	176	0
Grants	120	115	117
HUD-Community Development Block Grants	200	196	179
Economic Development Administration Grants	15	15	10
Appalachian Regional Commission	10	10	10
Bureau of Reclamation	140	140	168
Corps of Engineers	50	40	20
Total	705	692	504

SOURCE: Congressional Budget Office.

a. New loan obligations.

cilities. 6/ Though differing in many particulars, these bills shared two important characteristics. First, all would have provided funds for the construction and repair of a wide variety of infrastructure projects; each state and local government would allocate its share of this money according to its own infrastructure priorities. Second, the revolving fund would have assured a permanent source of infrastructure funds; loan repayments would have been used to make further loans.

The bills often differed in other respects, such as: how to capitalize the fund (by the federal government alone or by the federal and state governments together); whether to lend initial funds directly or to create a reserve fund against which larger sums could be borrowed (and then lent); and who should administer the fund (a new independent agency or an existing department). While none of these bills was enacted into law, Congressional interest in such revolving funds remains high.

6. See H.R. 1776 and H.R. 2818, among others.

CHAPTER II

WATER UTILITIES' NEED FOR CAPITAL, FISCAL YEARS 1984-2000

In the coming decades, municipalities will have to provide water service to populations that, more often than not, are growing. This chapter looks at the financial burden of supplying this water. The first section describes the methodology used to forecast regional capital spending for water supply. A second section presents projections of annual capital expenditures for water supply improvements from 1984 through 2000, and compares this spending with actual annual spending from 1977 through 1983. The chapter closes with some notes about the limitations of the estimates.

METHODOLOGY

Water utilities' demand for capital improvements depends ultimately on the demand for their water. Consequently, projections by the Congressional Budget Office (CBO) of capital spending begins with estimates of water demand. In forecasting this demand, CBO assumed that per capita usage would not change between 1984 and the end of the century; changes in water demand, therefore, reflect only changes in population. Using Census Bureau population projections, CBO forecast water use in the year 2000 for 10 different sizes of water systems within each Census region.

For each system size and region, CBO considered the demand for two kinds of capital improvements: those needed to replace existing facilities as they age, and those necessitated by growth in the demand for water. Where population (and, by assumption, water demand) grew by less than 20 percent, CBO assumed that only replacement spending would be needed, as the average existing system can deliver 20 percent to 40 percent more water than it currently has to provide. 1/ Where population grew by 20

1. National Association of Water Companies, *Financial and Operating Data--1983* (Washington, D.C.: National Association of Water Companies, no date); and American Water Works Association, *1981 Water Utility Operating Data* (Denver: American Water Works Association, 1981).

percent or more, CBO estimated the cost of providing additional facilities to meet this new demand.

The CBO estimated separately the cost of treating water, distributing water, and developing new sources of water supply. Treatment costs depended on whether the water came from a groundwater source, from a surface water source, or from some combination of the two; a system's water source, in turn, was a function of the system's size. The cost of both distributing and developing new sources of water also depended on the size of the water system. All costs were estimated using standard cost functions found in the engineering literature (see the appendix).

In order to compute an upper bound on the amount of capital spending that would be needed, CBO assumed that all capital spending, both for replacement and for expansion, would take place at the beginning of the forecast period. These costs then were amortized over the life of the component being built to reach an estimate of annual spending. 2/

CAPITAL EXPENDITURES FOR WATER SUPPLIES

From fiscal years 1977 through 1983, water utilities spent an average $4.7 billion annually to replace and expand local water supply facilities. 3/ The CBO estimates that these utilities will spend nearly the same amount--$4.5 billion annually--from 1984 through 2000. About 60 percent of this amount will be used to replace existing facilities; the remainder will provide facilities for expanded service. Whether these aggregate spending figures represent a stable financial burden to the customers of individual utilities depends on how this spending is distributed geographically and on the number and incomes of the people who must foot the bill.

Regional Capital Expenditures

Table 5 shows annual capital spending for each of the nine Census regions during the 1977-1983 period. The aggregate figures give little sense of the

2. Each component was assumed to last at least as long as the forecast period. The design lives were assumed to be 20 years for well fields, 30 years for treatment facilities, and 75 to 200 years for distribution systems (reservoirs were assumed not to need replacement).

3. Unless otherwise noted, all dollar amounts in this chapter are measured in 1984 dollars.

TABLE 5. ANNUAL CAPITAL SPENDING FOR MUNICIPAL WATER SUPPLIES, FISCAL YEARS 1977-2000, BY REGION (Ranked by percentage change in per capita spending)

Region	Annual Capital Spending 1977-1983 (In millions of (1984 dollars)	Annual Capital Spending 1984-2000 (In millions of 1984 dollars)	Percent Change in Annual Capital Spending	Annual Per Capita Spending 1977-1983 (In 1984 dollars)	Annual Per Capita Spending 1984-2000 (In 1984 dollars)	Percent Change in Annual Per Capita Spending	Forecast Per Capita Capital Spending as a Percent of 1983 Personal Income
Total United States	4,695.00	4,493.00	-4.30	24.61	21.80	-11.42	0.185
Mid-Atlantic	308.25	421.00	36.58	9.96	14.27	43.26	0.112
West-North Central	276.28	304.00	10.03	19.12	20.57	7.58	0.183
East-North Central	484.55	508.00	4.84	13.83	14.53	5.08	0.126
New England	146.35	143.00	-2.29	14.09	13.60	-3.49	0.104
Pacific	824.68	811.00	-1.66	31.47	26.34	-16.31	0.203
East-South Central	290.25	249.00	-14.21	23.55	18.70	-20.58	0.205
Mountain	522.74	525.00	0.43	54.45	41.60	-23.61	0.381
West-South Central	767.61	676.00	-11.93	38.27	28.95	-24.34	0.263
South Atlantic	1,074.41	856.00	-20.33	34.44	23.57	-31.54	0.211

SOURCE: Congressional Budget Office.

different burden that this spending imposed on each region, for the spending was paid for by populations of quite different sizes. The data showing spending per capita are more revealing. Nationwide, per capita capital spending for water supply averaged $24.61 per year. Across regions, capital spending varied widely, from $9.96 per capita in the Mid-Atlantic region to $54.45 per capita in the Mountain states.

A number of factors contribute to this spending diversity. Most important are regional differences in population growth. Regions often build water supply facilities in anticipation of population gains. Thus, other things being equal, investment per capita will be higher in those regions expecting the most rapid population increases.

The variation in spending also reflects regional differences in the cost of supplying water. These cost differences arise in part from the relative scarcity of water in each region. While the need for treatment and distribution are similar throughout the country, the cost of impounding surface water and transporting it to the areas where it is consumed is far greater in the West than in the East. Cost differences also rise from regional variation in the prices of the land and labor needed to build water supply facilities. 4/ Further, the economies of scale that characterize water supply technology reduce the cost per gallon as the system increases in size. Thus, water is generally cheaper to produce in those regions with a greater share of their populations in large urban areas.

Finally, an area's economic health will affect its capital spending. When regional income falls, capital improvements are often deferred until better economic circumstances return. Not surprisingly, regional capital spending on water supply from 1977 through 1983 is correlated with growth rates in regional personal income.

The CBO projects that, for the country as a whole, annual capital spending for local water supply will be 11 percent less per capita from 1984 through 2000 than it was from 1977 through 1983 (see Table 5). The change in per capita spending will vary widely by region. In six of nine Census regions, per capita spending will fall; the spending declines will range from 3 percent in the New England area to 32 percent in the South Atlantic region. Per capita spending will rise in three regions; but in two of these regions the increase will be less than 10 percent. In only one region, the Mid-Atlantic,

4. "Materials and Labor Cost Trends in the U.S.," *Engineering News Record (March 19, 1981), pp. 132-137.*